SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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NEW PLANET PORTRAIT

Lowell Observatory Proudly Photographs Its Discovery

(See page 197)

Vol. XVII No. 468

Paralysis Caused by Unknown Poison

Medicine

Substance Probably Added to Jamaica Ginger

INVESTIGATION into the nature of the poisonous substance in Jamaica ginger which caused paralysis outbreaks in Tennessee, Oklahoma, Kentucky and other states, has been hampered by the absence of any samples of the beverage that was actually drunk by any of the patients, health authorities have explained.

Peripheral polyneuritis is the scientific name for the disease, which has just been diagnosed clinically by local physicians and officers of the Tennessee state health department in cooperation with Dr. Hugh J. Morgan, associate professor of medicine at Vanderbilt University at Nashville. The paralysis is due to a poison which has affected certain sets of nerves. Just what the poisonous agent is has not yet been determined. Professor Morgan believes the disease may have resulted from the effects of two or more poisonous substances in alcohol fortified by a heavy metal dye or volatile substances. The chances for recovery from the condition are good, but it will be a matter of months before the patients are well again.

Study of 119 cases showed that four-fifths of them were from 20 to 45 years old, none being under 15. All but nine admitted the use of alcohol, either Jamaica ginger or some other form. Over four-fifths of the cases were in men or boys.

The drink was sold in small bottles containing from 60 to 80 per cent. alcohol. The rest was Jamaica ginger. Prohibition officials allowed this to be manufactured and sold thinking that the large amount of ginger would make it impossible for anyone to use it as a beverage. However, several hundred hardy drinkers consumed it in large amounts. Some of the patients admitted having drunk as many as fourteen or fifteen bottles of the stuff in a day or two. Because of the small amount in each bottle, each was well drained, and official investigators have not been able to obtain any of the same beverage that was drunk. Their analyses have been made on samples furnished by the manufacturer, which are supposed to be from the same lot as that causing the paralysis.

In these samples, no metal, no alkaloid, no isopropyl-alcohol, no denaturant of any sort has been detected. The supposition is that either the samples examined were from a different lot than those drunk by the paralytics or the stuff was adulterated by a bootlegger. In Kentucky, near Berea and Richmond, the stuff was sold by a man in a car who collected cash payments for every bottle sold, it is reported. This strengthens the bootlegger theory.

The fact that many of the paralytics are people of some prominence in their own communities has also hampered the official investigations. There is a natural reluctance to admit the drinking, and officials feel that probably some details are being withheld. While 119 cases have been investigated in Tennessee, official estimates place the number affected in that state at 400 or 500. In Kentucky, only 6 or 8 have been reported. These were mostly painters.

The paralysis set in as long as a week or even three or four weeks after the suspected beverage had been consumed. Some patients also complained of stomach and intestinal upsets. The paralysis affects the legs chiefly so that walking is extremely difficult or even impossible. However, there is sensation and a pin prick or touch of a hand on the paralyzed leg is felt. Some patients have had paralysis of the fingers, enough to give difficulty in buttoning their shirts or handling small objects.

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The Answer Is

In This Issue

Was the *drink* which caused the *paralysis* outbreak manufactured legitimately? p. 194—How is *excavating* made easy for *geologists* in Alaska? p. 195—What are some of the evidences of an *isthmus* between America and Asia? p. 195—How *fast* does the new *planet* travel? p. 197—At what *European* observatories has the new *planet* been observed? p. 197—What was the origin of "motion study" in factory management? p. 198—What *metal* is being used in place of iron for *gas pipes?* p. 200—What was once the strange *penalty* for picking *shrubs?* p. 200—How is it possible to be *comfortable* in a room cooler than 60 *degrees?* p. 200—Why has the parrot fever research been moved? p. 202—What ancient *sport* is now part of the *mental training* at a university? p. 204—Who is the *"hitch-hiker"* of the sea? p. 206—In what *new book* can one learn of the fundamentals of *anthropology?* p. 207.

Bright Comet Discovered

BRIGHT enough to be easily seen with a small telescope if it were not so close to the sun, a new comet was discovered on March 21, by a Polish astronomer named Wilk at the University of Cracow. The comet is of the seventh magnitude and was found in the constellation of Pisces, the fishes, low in the western evening sky just after sunset.

Astronomically expressed, its position when discovered was 1 hour 27 minutes right ascension and 18 degrees 3 minutes north declination. As comets become brightest when near the sun, Wilk's comet is probably now at nearly maximum brightness, and will probably not become conspicuous to the naked eye. Not until three accurate observations have been made, however, can its exact path be calculated.

Astronomy

Science News-Letter, March 29, 1930

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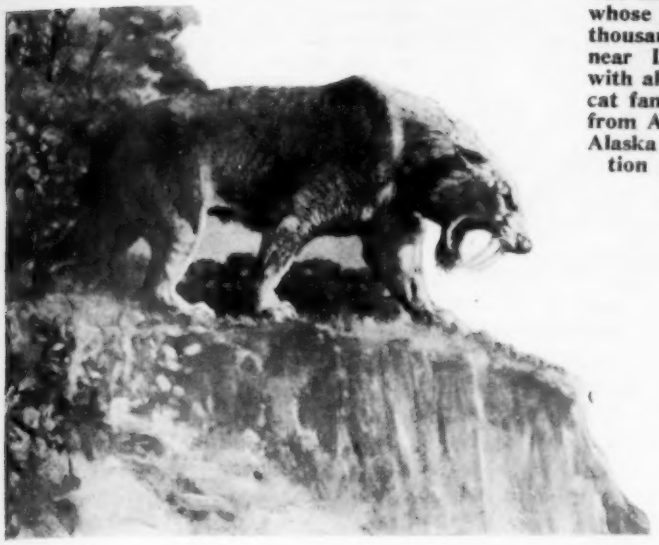

The ancient saber-tooth tiger, whose bones were found by thousands in the La Brea pits near Los Angeles, together with all other members of the cat family, probably migrated from Asia to America via the Alaska land bridge. Restoration painting by Knight.

Alaska's Vast Mines of Fossils Hold

Key to Ancient Animal Mysteries

Paleontology

By Frank Thone

SAY "Alaska" to any person who can remember the last years of the "gay nineties," and across his mental screen will instantly flash the responding word "Gold!"

For that is how the American public really became conscious of the existence of our vast territory on the northwestern corner of the continent. Alaska meant, and in much of our thinking still means, great hoards of wealth buried in the frozen soil, waiting for that epic army of the Gold Rush, with its picks and shovels and fortitude and endurance, to open up mines richer than King Solomon's in fabled Ophir and bring the gleaming nuggets and dust back home.

The gold rush is over now, and the gold mines have settled down to the soberer career of big business. But beside them—in some cases even on top of them—there are other mines of equal wealth in another field of human endeavor. They are mines for the mind, for their treasure consists of uncounted fossil bones of prehistoric animals which are only waiting for scientists to come and get them and piece them together, for the delight of crowds in our great museums and for our better understanding of how many of our wild animals came to America.

For these frozen fossil fields, these cold-storage warehouses as big as whole counties and as old as Adam, lie right across the tracks followed by animal migrations from Asia to America and from America to Asia. They contain chapters as yet unread of the history of animal life on both continents. A glance at the map will show how Alaska stands like a great keystone in the arch formed by the meeting of the two continents of North America and Asia. The elevation of a few miles of sea bottom a few hundreds of feet above their present level would close up Bering Strait and build a land bridge between the reaching fingers of the eastern and western hemispheres. Over such a bridge herds of wandering animals could go, planting colonies along their line of march and under favorable conditions leaving their bones to become fossils when they died.

All geologists are now agreed that such an isthmus connected Asia and America in the past, not once but several times, and that each time it arose a new inter-migration of animals occurred. The latest of these bridges served these emigrant tides before and during the pleistocene period, or great Ice Age, which began some hundreds of thousands of years ago and was still in progress when man became numerous and diversified into various sub-races on the earth. Before this bridge was submerged, Alaska served as a terminus of a two-way traffic that has left its records of animal remains in the earth that subsequently froze over them and has kept them safe from the moulds and microorganisms that remorselessly wipe out such documents in most other parts of the world. Alaska therefore offers an especially favorable field for the student of ancient animal life.

What the totality of Alaska's fossil wealth may be, nobody knows as yet. Very little in the way of intensive digging has so far been undertaken. As a matter of fact, such hard labor has not yet become necessary, for in several places fossils are so abundant and so easy to get at that it is hardly an exaggeration to say they can be had for the picking up. Dr. Philip P. Smith of the U. S. Geological Survey, a veteran Alaskan, has long been an advocate of the exploitation of these scientific resources, and he now has the satisfaction of seeing several institutions actively in the field.

One of the best of the bone deposits is also one of the queerest. Along the flood plain of the Goldstream, southeast of Fairbanks, chief interior town of Alaska, the deposit of gold-bearing gravel lies in a wide expanse, and on top of it is a frozen mass of mixed ice and sandy silt twenty feet or more in thickness. Melted down, the mixture proves to be, on the average, one-third solid and two-thirds liquid. Running through the gray silt-ice are veins and dikes and sills of clear ice, evidently intruded from beneath as water during ages of weird ice-geology. But the whole thing has been frozen now for untold thousands of years.

Once, however, the silt deposit must have been more nearly solid earth, at least during parts of the year. It afforded foothold for great numbers of wandering animals, and was dry enough to permit innumerable wild rats to burrow in it. For bones of a vast miscellany of large mammals are found scattered through it, some of them in neat, orderly skeletons, just as their owners lay when they died,

others in disconnected helter-skelter, with many parts missing.

But most interesting are the fossil rat-nests. They crop up in all sorts of places when the frozen soil is cut away, like raisins in a cake. Often the rat skeletons are to be found also, and since these animals died under ground and were consequently in ready-made graves from the moment they gave up the ghost, their bones are frequently in perfect condition and neatly arranged, with every tooth and tail-joint still in place.

There is an opportunity for botanical research in these rat nests also, for they are lined with quantities of vegetable fiber and leaves, from the rushes and tough grasses that grew in the riverside marshes in that far distant time.

The great beauty about this particular frozen fossil field is that whoever undertakes to explore it needs to do no digging. In most fossil-yielding areas the ambitious scientist must humble himself to the status of a pick-and-shovel "hunky," and move bushels of dirt for every bone he recovers. But this place would be paradise for lazy geologists—if there are any such creatures.

For there is a mining company operating in this area, and it has to get the frozen silt out of the way in order to reach the gravel which is its particular prize. Even this does not involve pick-and-shovel work. The seventy per cent. ice content of the frozen soil simplifies the task. It is possible to melt it away by flowing streams of water over it, or playing water against the sides of the ice-silt bluffs from a low-pressure nozzle.

This cuts and gullies the queer mixture of soil and ice, producing a landscape that looks something like the Dakota bad lands and something like a half-gone iceberg. Fantastic pillars stand up, capped by a thicker and more resistant layer of soil. For a few days

Enormous tusks of long-extinct members of the elephant family are frequently found on the shores of the Arctic ocean.

they defy the weather, and then dwindle and break in the middle, dropping their ragged heads to the muddy gravel beneath.

And through and over this welter of a ten-thousand-year-old world of ice and mud being destroyed in a day, the searching scientists can wade, getting their bones for the mere picking up, or studying the way they are embedded in the freshly exposed faces of the silt-ice cut by the working water.

It is highly desirable that a scientist be kept on the spot during the placer-washing season, when the bones are thawed loose and will be scattered and lost unless some intrested and qualified person is there to retrieve them. Recently a cooperative arrangement has been made by the Alaska Agricultural College at Fairbanks and the American Museum of Natural History, whereby one or more collectors will be on the job throughout each open season.

But although these two institutions have preempted this unique locality, where the geologist finds his digging done for him without effort on his part, by the mining company's surplus water power, there are still vast potential fossil mines left in Alaska, completely untouched. Far up on the north coast, where the low, desolate tundra fronts the Arctic Ocean for hundreds of miles, one occasionally finds the giant skulls of mammoths, with their long, curving tusks sticking up from the low scrub and moss like fantastic snags of timber. Dr. Smith says that at least once he turned aside from his course to investigate what appeared at first to be a solitary willow bush, only to find, on closer approach, that the object was the tusk of one of these huge Arctic elephants. There are other prehistoric bones scattered about on or near the surface, in some places quite abundantly; and how much there may be underneath is as yet a matter of conjecture only.

One of the richest, and possibly the most significant, of the fossil deposits in Alaska has been uncovered at Elephant Point, a promontory overlooking an arm of the Bering Sea, very close to the strait that probably was at one time a land bridge to Asia. The fossils here are eloquent of a wealth and variety of animal life passing to and from Asia before or during Ice Age times. There are, of course, elephants —the great, hairy, curve-tusked mammoths that ranged all the cold lands of the earth a hundred thousand years ago, and passing in their restless wanderings across the Bering land bridge, populated the Americas with their kind. Not only their bones and teeth, but pieces of their thick skin with eighteen-inch hair attached, have been found here. In addition to the mammoths, there are horses, bison, musk-ox, deer, wolves and bear, and evidence of the presence of beaver has been found in fossil beaver-dams.

It is curious to note species of both American and Old-World origin at this paleontological bridge-head. The elephant family un- (*Turn to page* 204)

The Trek, as painted by Knight for the Field Museum. Elephants have not always been tropical beasts.

Wanted: Early Planet Photographs

Astronomy

They Would Help Tell its Orbit

WITH the discovery of the planet beyond Neptune, by Lowell Observatory astronomers, many months of observation will be needed before even an approximate idea can be obtained of the orbit in which it is moving. A planet like this moves in the ecliptic, the plane in which the earth itself revolves around the sun, and to determine just where this path is four different observations, giving its direction from the earth upon four different occasions, are needed. If it were not moving in the ecliptic, three would suffice, as they do for orbits of comets.

The farther apart the positions of the planet at the times of these observations, the more precisely can the calculation be made. All the planets move in ellipses, nearly circular. To the mathematician, by the way, a circle is an ellipse in which the long and short diameters happen to have the same length. Eclipses might differ widely in shape, and yet over a small segment be very similar. Therefore to determine their shape with any accuracy, rather a good sized piece must be known.

The new planet is moving very slowly through space. Probably it takes nearly three hundred years to travel once about the sun, so that in even a year it would cover only about a three hundredth of the total path. Observations made of it during the next few months, therefore, will give only a rough idea of its orbit. A range of several years, at least, will be required before astronomers can get a really accurate orbit, for there is no way of hurrying it.

But there is one chance of getting an orbit sooner, and that is if a search of photographic plates made in past years should happen to show it. Photographs of the heavens have been made for about half a century, and while the early ones do not reveal objects as faint as the planet, of the fifteenth magnitude, some made a quarter of a centry ago probably would. If it should happen that some astronomer, in some part of the world, took a plate in 1905, for instance, that showed the planet with a swarm of stars, then a much shorter time would be required to determine its orbit. If two or three such observations should be discovered, then the orbit could be accurately calculated within a few weeks. Then astronomers would know in fact, whether this really is the ninth planet, or whether, indeed, it is the tenth planet, the ninth yet remaining for discovery.

The cover photograph shows the new planet (in circle) as it appears in the sky viewed by the 42-inch reflector at Lowell Observatory, where it was discovered. Dr. C. O. Lampland operated the telescope when the photograph was made. The bright star at the bottom is delta Geminorum, the four "points" being diffraction effects caused by the supports holding the second mirror in the telescope.

Something similar to this happened in connection with the discovery of Neptune, the last major planet to be discovered before this year. Neptune was first located in the sky on September 23, 1846. Then it was found that Joseph Jérome le Francois de Lalande, a French astronomer at the Paris Observatory, had observed it and recorded its position in May, 1795, more than fifty years before, without noticing that it was not a star. This observation at once provided a long range, and an accurate orbit was soon calculated.

Additional Observations

As soon as the discovery of a new planet was announced, observatories throughout the world began to look for it, seeking to be among the first to see this new addition to the sun's family. But to find it is not an easy task. It does not differ in appearance from a faint star, so even with a telescope powerful enough to reveal objects as faint as the fifteenth magnitude it might be seen but not identified. What is needed is a map showing its position, and as no such maps are yet available, an observatory must make its own by photography. No general star maps show objects so faint.

The first thing to be done, therefore, is to take a photograph of the region of the sky, giving an exposure long enough to record a fifteenth magnitude star, perhaps of several hours. Then, on the following night, another such photograph is made. By comparing the two the planet is found, because it is slowly moving and is in a slightly different place in each photograph. An instrument called a "blink-microscope," used in many observatories, facilitates the comparison, because first one plate, then the other, can be seen in rapid succession. The stars stand still as the observer watches through the eyepiece, but the moving planet dances to and fro in a most conspicuous manner. This in fact was the way the planet was discovered. Then, when the planet has been identified on a photograph, this may be used at the telescope as a map to locate it visually.

The Steward Observatory, at the University of Arizona, Tuscon, was one of the first to find it, using this method. About the same time it was located at the Yerkes Observatory of the University of Chicago. Later it was observed at the Naval Observatory, Washington, at the Harvard College Observatory, Cambridge, at their station in South Africa; and in Europe at the Königstuhl Observatory, Heidelberg, and the University of Berlin's observatory at Neu-Babelsberg. It is still in the constellation of the Twins, Gemini.

Science Radio Talks

FOUR prominent scientists will address the nation over a country-wide network of the Columbia Broadcasting System during April, under the auspices of Science Service. The talks will be given from 3:45 to 4:00 p. m. every Friday. Following is the program:

April 4—Dr. Paul R. Heyl, physicist, U. S. Bureau of Standards—"Weighing the Earth."

April 11—Dean Edward W. Berry, paleontologist, Johns Hopkins University—"The Ancestry of Our Trees."

April 18—Dr. C. G. Abbot, astronomer, secretary, Smithsonian Institution—"The Sun and Ourselves."

April 25—Dr. Arthur H. Compton, physicist, University of Chicago and Nobel Laureate—"What is Light?"

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Lower Costs and Higher Wages — A Classic Invention

Factory Management

SHOP MANAGEMENT, by Fred. W. Taylor, Philadelphia. Presented at the Saratoga meeting (June, 1903) of the American Society of Mechanical Engineers, and forming part of Volume XXIV. of the Transactions.

This is the paper that marked an epoch in the machine age and inaugurated the much-discussed motion study. Taylor's attitude on the human side of labor problems is shown in his words: "No system of management, however good, should be applied in a wooden way. The proper personal relations should always be maintained between the employers and men; and even the prejudices of the workmen should be considered in dealing with them. . . . The opportunity which each man should have of airing his mind freely, and having it out with his employers, is a safety-valve; and if the superintendents are reasonable men, and listen to and treat with respect what their men have to say, there is absolutely no reason for labor unions and strikes."

IT is safe to say that no system or scheme of management should be considered which does not in the long run give satisfaction to both employer and employee, which does not make it apparent that their best interests are mutual, and which does not bring about such thorough and hearty co-operation that they can pull together instead of apart. It cannot be said that this condition has as yet been at all generally recognized as the necessary foundation for good management. On the contrary, it is still quite generally regarded as a fact by both sides that in many of the most vital matters the best interests of employers are necessarily opposed to those of the men. In fact, the two elements which we will all agree are most wanted on the one hand by the men and on the other hand by the employers are generally looked upon as antagonistic.

What the workmen want from their employers beyond anything else is high wages, and what employers want from their workmen most of all is a low labor cost of manufacture.

These two conditions are not diametrically opposed to one another as would appear at first glance; on the contrary, they can be made to go together in all classes of work, without exception, and in the writer's judgment the existence or absence of these two elements forms the best index to either good or bad management.

THIS PAPER IS WRITTEN MAINLY WITH THE OBJECT OF ADVOCATING HIGH WAGES AND LOW LABOR COST AS THE FOUNDATION OF THE BEST MANAGEMENT, OF POINTING OUT THE GENERAL PRINCIPLES WHICH RENDER IT POSSIBLE TO MAINTAIN THESE CONDITIONS EVEN UNDER THE MOST TRYING CIRCUMSTANCES, AND OF INDICATING THE VARIOUS STEPS WHICH THE WRITER THINKS SHOULD BE TAKEN IN CHANGING FROM A POOR SYSTEM TO THE BETTER TYPES OF MANAGEMENT.

The condition of high wages and low labor cost is far from being accepted either by the average manager or the average workman as a practical working basis. It is safe to say that the majority of employers have a feeling of satisfaction when their workmen are receiving lower wages than those of their competitors; and on the other hand that very many workmen would feel contented if they found themselves doing the same amount of work per day as other similar workmen do and get more pay for it. Yet employers and workmen should alike look upon both of these conditions with apprehension, as they are either of them sure, in the long run, to lead to trouble and loss for both parties.

Through unusual personal influence and energy, or more frequently through especial conditions which are but temporary, such as dull times when there is a surplus of labor, a superintendent may succeed in getting men to work extra hard for ordinary wages. After the men, however, realize that this is the case and an opportunity comes for them to change these conditions, in their reaction against what they believe unjust treatment they are almost sure to lean so far in the other direction as to do an equally great injustice to their employer.

On the other hand, the men who use the opportunity offered by a scarcity of labor to exact wages higher than the average of their class, without doing more than the average work in return, are merely laying up trouble for themselves in the long run. They grow accustomed to a high rate of living and expenditure, and when the inevitable turn comes and they are either thrown out of employment or forced to accept low wages, they are the losers by the whole transaction.

The only condition which contains the elements of stability and permanent satisfaction is that in which both employer and employes are doing as well or better than their competitors are likely to do, and this in nine cases out of ten means high wages and low labor cost, and both parties should be equally anxious for these conditions to prevail. With them the employer can hold his own with his competitors at all times and secure sufficient work to keep his men busy even in dull times. Without them both parties may do well enough in busy times, but both parties are likely to suffer when work becomes scarce.

The possibility of coupling high wages with a low labor cost rests mainly upon the enormous difference between the amount of work which a first-class man can do under favorable circumstances and the work which is actually done by the average man.

That there is a difference between the average and the first-class man is known to all employers, but that the first-class man can do in most cases from two to four times as much as is done on an average is known to but few, and is fully realized only by those who have made a thorough and scientific study of the possibilities of men.

The writer has found this enormous difference between the first-class and average man to exist in all of the trades and branches of labor which he has investigated, and this covers a large field, as he, together with several of his friends, have been engaged with more than usual opportunities for twenty years past in carefully and systematically studying this subject.

This fact is as little realized by the workmen themselves as by their employers. The first-class men know that they can do more work than the average, but they have rarely

made any careful study of the matter. And the writer has over and over again found them utterly incredulous when he informed them, after close observation and study, how much they were able to do. In fact, in most cases when first told that they are able to do two or three times as much as they have done they take it as a joke and will not believe that one is in earnest.

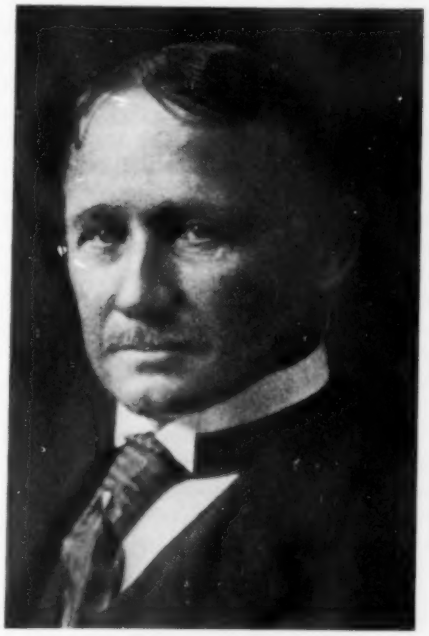
It must be distinctly understood that in referring to the possibilities of a first-class man the writer does not mean what he can do when on a spurt or when he is over-exerting himself, but what a good man can keep up for a long term of years without injury to his health, and become happier and thrive under.

The second and equally interesting fact upon which the possibility of coupling high wages with low labor cost rests, is that first-class men are not only willing but glad to work at their maximum speed, providing they are paid from 30 to 100 per cent. more than the average of their trade.

The exact percentage by which the wages must be increased in order to make them work to their maximum is not a subject to be theorized over, settled by boards of directors sitting in solemn conclave, nor voted upon by trades unions. It is a fact inherent in human nature and has only been determined through the slow and difficult process of trial and error.

The writer has found, for example, after making many mistakes above and below the proper mark, that to get the maximum output for ordinary shop work requiring neither especial brains, very close application, skill, nor extra hard work, such, for instance, as the more ordinary kinds of routine machine shop work, it is necessary to pay about 30 per cent. more than the average. For ordinary day labor requiring little brains or special skill, but calling for strength, severe bodily exertion and fatigue, it is necessary to pay from 50 per cent. to 60 per cent. above the average. For work requiring especial skill or brains, coupled with close application but without severe bodily exertion, such as the more difficult and delicate machinist's work, from 70 per cent. to 80 per cent beyond the average. And for work requiring skill, brains, close application, strength and severe bodily exertion, such, for instance, as that involved in running a well-run steam hammer doing miscellaneous work, from 80 per cent. to 100 per cent. beyond the average.

There are plenty of good men ready to do their best for the above percentages of increase, but if the endeavor is made to get the right men to work at this maximum for less than the above increase, it will be found that most of them will prefer their old rate of speed with the lower pay. After trying the high speed piece work for a while they will one after another throw up their jobs and return to the old day work conditions. Men will not work at their best unless assured a good liberal increase, which must be permanent.



Frederick W. Taylor

It is the writer's judgment, on the other hand, that for their own good it is as important that workmen should not be very much overpaid, as that they should not be underpaid. If overpaid, many will work irregularly and tend to become more or less shiftless, extravagant and dissipated. It does not do for most men to get rich too fast. The writer's observation, however, would lead him to the conclusion that most men tend to become more instead of less thrifty when they receive the proper increase for an extra hard day's work, as for example, the percentages of increase referred to above. They live rather better, begin to save money, become more sober, and work more steadily. And this certainly forms one of the strongest reasons for advocating this type of management.

In referring to high wages and low labor cost as fundamental in good management, the writer is most desirous not to be misunderstood.

By high wages he means wages which are high only with relation to the average of the class to which the man belongs and which are paid only to those who do much more or better work than the average of their class. He would not for an instant advocate the use of a high-priced tradesman to do the work which could be done by a trained laborer or a lower-priced man. No one would think of using a fine trotter to draw a grocery wagon nor a Percheron to do the work of a little mule. No more should a mechanic be allowed to do work for which a trained laborer can be used, and the writer goes so far as to say that almost any job that is repeated over and over again, however great skill and dexterity it may require, providing there is enough of it to occupy a man throughout a considerable part of the year, should be done by a trained laborer and not by a mechanic. A man with only the intelligence of an average laborer can be taught to do the most difficult and delicate work if it is repeated enough times; and his lower mental calibre renders him more fit than the mechanic to stand the monotony of repetition. It would seem to be the duty of employers, therefore, both in their own interest and that of their employees to see that each workman is given as far as possible the highest class of work for which his brains and physique fit him. A man, however, whose mental calibre and education do not fit him to become a good mechanic (and that grade of man is the one referred to as belonging to the "laboring class"), when he is trained to do some few especial jobs, which were formerly done by mechanics, should not expect to be paid the wages of a mechanic. He should get more than the average laborer, but less than a mechanic; thus insuring high wages to the workman, and low labor cost to the employer, and in this way making it most apparent to both that their interests are mutual.

To summarize, then, what should be aimed at in all establishments is:

1. That each workman should be given as far as possible the highest grade of work for which his ability and physique fit him.

2. Each work- (*Turn to page 205*)

Aluminum Gas Pipes

Light, thin-walled drawn aluminum tubing, which can be bent at right angles instead of having to be cut and screwed into angle fittings, is coming into use in Germany to replace the old-style heavy iron pipes used in houses for carrying cooking and lighting gas.

It is claimed that the new tubing can be used in considerably smaller sizes than iron pipes not only because of its thinner walls, but because it is completely smooth inside and therefore offers less resistance to the flow of the gas. It is also much less unsightly than the old pipes.

Angles are bent in it at any desired point by means of a special hand-operated tool employing a clamp and two channelled rollers. Where joints or T-fittings are necessary, self-sealing aluminum castings are used.

The tubing is made in sixty-foot lengths, which can be coiled up and carried over the workman's shoulder if necessary, thus reducing the expense of cartage and eliminating the traffic dangers attendant to having long lengths of stiff piping sticking backward out of a truck.

Engineering
Science News-Letter, March 29, 1930

School Reading

One of the classic criticisms leveled for forty years against the education of children in the United States has been tested and found to be no longer true, Dr. Charles H. Judd, of the University of Chicago, showed in an address before the meeting of the Department of Superintendence of the National Education Association.

It was in 1890 that President Eliot of Harvard startled everybody by his assertion that all the reading material covered by children in a typical public school in the third to eighth grades could be read aloud in 46 hours. After forty years, Dr. Judd has checked up to see whether the reading matter in school courses is still worthy of criticism as a thinly skimmed product. Dr. Judd asked teachers of fifth grades to estimate the amount of reading material covered by their pupils.

"I find that the amount of reading mastered in the average present-day fifth grade is eight or more times as great as that reported by President Eliot," he reported.

"The meaning of these facts is clear. Even if we make our comparison without regard to such additions to the curriculum as the arts and the special subjects such as physical education, the difference in quantity of reading shows that there has taken place within the last four decades a great expansion in the content of instruction in American schools. This expansion of the curriculum has been necessary to keep education abreast of expanding civilization.

"The demands made upon the individual in our times for a broad view of the world are so far in advance of those which were imposed on the common man in 1890 that the elementary school has been compelled to enlarge its offerings much beyond what was provided a generation ago."

Education
Science News-Letter, March 29, 1930

Conservation

Every leaf you pluck costs you a piece of your shirt.

This stringent and fantastic penalty was exacted for violating the protection bestowed by an emperor on a tree. The tree was an ancient lime-tree that stood in the town of Adelsheim in Baden, and the Emperor Ruprecht decreed its perpetual protection in 1401. So strong was the tradition of this medieval enactment that even at the beginning of the nineteenth century offenders were still penalized for plucking twigs or leaves; although a modification of the original rule, almost as fantastic as the emperor's whimsical decree itself, let offenders off with whole shirts if they would buy ribbons and tie them to the tree.

By 1857, however, the tree had declined to such a ruinous state that it had to be cut down, and for fifty years or so its place stood empty. Now, however, a new lime-tree grows where the "emperor's tree" once stood.

Forestry
Science News-Letter, March 29, 1930

Storing Electricity

A mythical storage battery of enormous size in which electricity could be stored during times of its abundance at flood seasons or off-peak load periods and from which it could be drawn during dry weather and heavy demand is no longer a mere dream of engineers.

Such a device, though scarcely resembling a storage battery, has recently been put in operation in the United States. It cost about $6,000,000.

In discharging, it will supply 32,160 horse-power continuously for 1,116 hours. In charging, 3,105 hours are required to return this enormous amount of energy.

It is the Rocky river pumped-storage hydro-electric plant of the Connecticut Light and Power Company. When power is abundant on the company's system, two huge 8,100 horse-power pumps, the highest power single centrifugal units in America, fill the storage reservoir by pumping water

IN VARIOUS SCI

from the Housatonic river, one mile distant. Then at peak load when power is scarce, this water falls back through the power house, turning a 24,000 kilowatt generator.

In actual practice the pumps would have to operate only about 2,320 hours before the reservoir would be filled, because some additional water is supplied from a small drainage area.

Strangely, most of the electric power used to pump the water into the reservoir is supplied by a steam plant. The combined efficiency of converting the steam to electricity, of pumping the water with electricity and of using the water to make electricity again, is 61 per cent.

The storage reservoir is 10 miles long and one and three-quarter miles across at its widest point. It contains 6,210 million cubic feet of water useful in producing power. This water is between 200 and 230 feet above the turbo-generator.

This is thought to be the first pumped storage station in the United States, although several are in existence elsewhere. One has been installed recently for a German power plant near Niederwartha.

Electricity
Science News-Letter, March 29, 1930

Ingenious Smokers

Ambassador Dawes' famous underslung pipe, which was looked upon as the last word in radicalism in smoking utensils when first it burst upon the hazy horizon of nicotinic America, is tame and conservative by comparison with the multitude of pipes and other tobacco-using devices which have been invented by the natives of Africa and Madagascar. The dark inhabitants of the dark continent have added to the conventional pipe-material, wood and clay, such things as antelope horns, gourds of many species, bamboo, and a hole in the ground partly filled with water. Some of them have even been known to smoke their flintlock muskets, filling the priming-pan with tobacco and sucking the smoke out through the muzzle.

Three scientists of the Field Museum of Natural History, Berthold Laufer, Wilfrid D. Hambly and Ralph Linton, have made a study of tobacco and its use in Africa. They report that although the plant was not introduced until considerably later than its discovery in America, it is now

smoked, chewed and snuffed all over the continent and on the neighboring big island of Madagascar. In most places everybody is a tobacco user—men, women and children alike. But a few tribes, mainly those under Mohammedan influence, abstain from tobacco or limit its use. On the other hand, some groups increase the potency of their smokes by adding jimson-weed or hemp, the latter plant having reached Africa from Arab sources.

One tribe includes in its tradition of the introduction of tobacco a tribute to the soothing qualities of the weed that would do credit to Ik Marvel himself:

"When you have had a quarrel with your brother, you may wish to kill him; sit down and smoke a pipe. By the time this is finished, you will think that death is too great a punishment for your brother's offence, and you will decide to let him off with a thrashing. Relight your pipe and smoke on. As the smoke curls upward, you will think that a few harsh words would serve instead of blows. Light your pipe once more and, when the bowl is empty, you will be ready to go to your brother and forgive him."

Customs
Science News-Letter, March 29, 1930

Warming the Walls

Principles of heating used in Roman villas 2000 years ago are being applied to homes today to produce conditions of the atmosphere excellently suited to the human body.

The Latins warmed their marble floors with underground flues and basked in the radiated heat. Now hot water pipes or electrical units installed high up on the wall or in the ceiling, invisible beneath the plaster, keep a room comfortable at a temperature as low as 60 degrees Fahrenheit and impart to its occupants a freshness and vigor lacking in warmer rooms.

This new form of heating, called panel warming, and the way it keeps a person comfortable at temperatures, the mere thought of which brings shivers to many, were told by L. J. Fowler, of London, before the recent International Heating and Ventilating Exposition.

Dressed in a bathing suit one can stand in the middle of a snow-covered field and experience no discomfort, Mr. Fowler said, provided the sun is shining brightly and there is no wind. The heat of radiation directly from the sun and reflected from the snow is sufficient to keep a person warm even when the mercury has fallen, if there is no wind to carry heat from the body.

The same principle applies to the panel heated room, Mr. Fowler explained. Heat is radiated from the upper walls and ceiling, and one feels comfortable at a comparatively low temperature. The panels, which need to be only slightly warmer than the atmosphere in the room, do not set up draughts, as the more concentrated and hotter heat units do, to take heat from the body.

In a test conducted by Dr. Vernon, of the British Industrial Fatigue Research Board, the upper air in a panel heated room was found to be just one degree warmer than that near the floor. In an ordinary room this temperature difference is many times greater. The panels themselves were only two and three degrees higher than room temperature.

Modern panel warming is only 20 years old. It was first employed in England where it has been used in numbers of public buildings and the better residences. It is spreading to countries in Europe and other parts of the world.

The cost of installing panel warming is said to be little higher than that of a system employing enclosed radiators. Its continuous operation is considered reasonable, but intermittent heating with the panel system is expensive. When used constantly it is especially well suited to care for a sudden fall in temperature because heat is stored in the walls ready to combat the change.

Engineering
Science News-Letter, March 29, 1930

Smallest 'Possum

The world's smallest oppossum, a tiny animal no bigger than a mouse, is a native of Argentina. H. Harold Shamel of the U. S. National Museum, who describes the new species in the Journal of the Washington Academy of Sciences, states that the specimen was collected some time ago by Dr. Alexander Wetmore, but that it remained unstudied until now.

The little opossum is less than five inches from nosetip to tailtip, and nearly half its length is accounted for by tail. The specific name given it is *muscula*, which means "little mouse." There are many species of mouse which are larger.

Zoology
Science News-Letter, March 29, 1930

Interference

It is next to impossible for the radio enthusiast who lives within a few blocks of a high-powered station to get a distant program.

That is just what the aviator has to do, only the interfering broadcaster is within a few feet of his supersensitive receiver. In fact, it is the engine.

The U. S. Bureau of Standards has effectively silenced this local broadcaster, the engine ignition system, by sheathing it and all its parts and wires in metal.

The wires are housed in a liquid-tight flexible metal tubing with a surrounding layer of copper braid to insure sufficient shielding. Water-tight fittings are provided at both the spark plug and magneto ends.

Engine interference is successfully eliminated from sets having an overall voltage amplification of about 3,000,000 to 5,000,000. The assembly is now in commercial use.

Radio—Aviation
Science News-Letter, March 29, 1930

Raising Wood Crops

Several hundred acres of waste land in the eastern part of the United States have been planted in hybrid poplar trees which will yield a crop of pulp wood for the paper industry comparable in value to the financial return from flaxstraw and cotton.

This is the first practical application of research conducted during recent years by Dr. Ralph H. McKee and others scientifically to increase America's diminishing supply of wood. Its success was described by Dr. McKee before the Franklin Institute recently.

The new hybrids will produce from 10 to 14 times as much wood per year as wild poplars growing under similar conditions, their studies disclose. In 60 years natural reforestation yields about six cords of useful wood per acre, or 125 pounds of cellulose a year from each acre, it was pointed out. The yield per acre-year for cotton is 150 pounds of cellulose, for flaxstraw 100 pounds and cornstalks nearly 500 pounds.

"Well managed reforestation plantations of pulpwood using wild species produce about 2,000 pounds of cellulose per acre-year," Dr. McKee said. "From the new hybrid poplar plantations we have every reason to expect 80 cords of pulpwood per acre in 12 years, that is, an average of about 16,000 pounds of merchantable wood per acre-year, equivalent to 8,000 pounds of cellulose."

Forestry
Science News-Letter, March 29, 1930

New Machine for Molding Cast Iron

Metallurgy

NO longer must temporary sand forms, which are destroyed as soon as molten metal hardens in them, be made for every object cast.

Small articles of low melting point metals have been die cast for years. Now there is in use in Europe a machine which forms articles from cast iron, a high melting point metal, continuously in the same mold.

"Machines of this type will undoubtedly be installed in this country in the near future," Charles Pack, New York consulting engineer, told the American Society for Testing Materials recently.

Pressing flat sheets of steel into automobile bodies and other shapes is becoming more and more an accurate science, it was revealed by W. H. Graves, a metallurgist of Detroit.

For a long time the only way to find how deep a sheet should be stamped was to try it in the press and this method of trial and error was wasteful and inaccurate, Mr. Graves said. Now simple tests show in advance not only how far a sheet can be bulged out of shape before breaking, but also how much force will be required.

Bearings in which the wheels of industry turn with least effort are made of a hard and a soft metal.

"It is now generally accepted that a single constituent metal is not well suited for bearing purposes," Prof. Clair Upthegrove, of the University of Michigan, said.

The hard metal supports the load and resists wear. The soft one wears away and forms slight depressions in which small amounts of the lubricant may be retained, Prof. Upthegrove explained.

Science News-Letter, March 29, 1930

Parrot Fever Work to Be Moved

Medicine

WHEN the U. S. Public Health Service's studies on parrot fever are resumed, it will be at one of the government's quarantine stations, probably either the one on Craney Island near Norfolk, the one on Reedy Island in the Delaware river near Lewes, or the one on Swinburne Island at New York City. A fourth location, an island quarantine station at Portland, Maine, is also under consideration but is not favored so much as the other three, because of the severe winters there.

The selection of an island quarantine station has resulted from recommendations of the special board appointed by Surgeon General Hugh S. Cumming to investigate the parrot fever situation at the Hygienic Laboratory, where eleven persons contracted the disease while the studies were going on.

The board reported that the present facilities at the Hygienic Laboratory are totally inadequate, and recommended that a new building be constructed. Pending this construction, thorough overhauling of the present structure, including painting, cleaning, etc., was advised.

The board further recommended that further investigations on parrot fever or similar diseases be temporarily carried out at an isolated place. The maritime quarantine stations, particularly those located on islands, were immediately considered.

These have laboratory and hospital accommodations for handling cases of infectious disease coming in on ships. These facilities can readily be enlarged to take in the parrot fever investigations, it was explained. The station at Reedy Island has the most convenient arrangements for quartering the investigators and their families, and the climate is not too severe. It is isolated, but not inaccessible at all. However, no decision has yet been made as to which station will be chosen for this work.

Neither have the men to carry it on been selected, although Dr. Charles Armstrong, who was conducting the parrot fever studies before he became ill, and Dr. L. F. Badger, who has collected blood from recovered parrot fever patients for convalescent serum, have been mentioned.

Dr. Armstrong is entirely well but still rather weak, as he has given blood several times for the serum with which other parrot fever patients are treated. It is expected that the parrot fever studies will be resumed within a week or so, as soon as the new location can be made ready.

No new cases have been reported in the last three days, and all the patients are doing well except the two negroes, Fred Blackwell and C. Murphy, who are still quite sick.

Of the entire force of the Hygienic Laboratory, numbering about 120, ten have contracted the disease, and one died of it. In only two cases were the victims working directly on the disease.

Science News-Letter, March 29, 1930

Low Voltage Dangerous

ALTERNATING current is more dangerous at low voltages than at high voltages and direct current is more dangerous at high than at low voltages. This is the curious conclusion reached by Prof. W. B. Kouwenhoven, an electrical engineer, and Prof. Orthello R. Langworthy, associate in neurology, following extensive studies on rats in the laboratories of Johns Hopkins University.

The two scientists insist that the results of their tests on 286 rats cannot be applied directly to men or other animals. But the facts they learned tie in well with existing knowledge of the effect of electricity on human beings. Statistics show that the annual death rate from electric shock is nine-tenths per 100,000 and that one-third of these fatal accidents occur on low voltage circuits.

"On high voltage circuits the victim is often thrown away from the conductors by the severe contraction of the muscles, but on low voltage circuits it is often impossible to let go," a recent report to the American Institute of Electrical Engineers says. "No authentic record has been found, however, of a death on a 110-volt direct circuit."

"If the skin is wet, 110-volt alternating-current house circuits are dangerous. The sensation produced by an alternating current of 15 to 20 thousandths of an ampere is extremely painful and a current of 100 milliamperes may cause death," the report says.

Electricity

Science News-Letter, March 29, 1930

Magnetic Hardening

Metals can be superhardened by magnetic treatment as well as by heat treatment, E. G. Herbert reports before the Iron and Steel Institute.

Magnetic hardening is accomplished by repeatedly changing the polarity of the steel, Mr. Herbert explains. A specimen so created could not be hardened more by low temperature annealing, he says.

Whether the magnetic treatment is apt to become of commercial value is not indicated. It is evident that both magnetism and heating doubtless produced the same atomic rearrangement. This phenomenon may lead to the finding of additional information about the structure of magnetic metals.

Metallurgy

Science News-Letter, March 29, 1930

Are you blindly groping for words to fit your thoughts?

"What word conveys the exact shade of meaning I desire?"
"Is there a better word than the one I am using?"
"What is that word I have forgotten?"
"Is there a word in the language which expresses my thought clearly?"
"How can I avoid this constant repetition?"

STRANGE, isn't it, with all the marvelous wealth of our English language that you should find yourself groping blindly for the answers to such word questions as those above.

Strange, with a language so full of expressive words, that it should be so difficult to find the ones that express your thoughts clearly.

With more than 150 words describing various shades of beauty, or over 400 words denoting various degrees of goodness, for instance, why should it be so hard to find the best one for your purpose?

Yet it is not strange either, when you consider that dictionaries are arranged on the assumption that you know all of the more than 200,000 words in the language and seek merely their definitions—that all attempts to make the language available stopped with merely listing the words by ideas, and then not always in alphabetical order.

No wonder the average working vocabulary is less than 2500 words—that you find it so difficult to express your thoughts and your most powerful ideas become mere vague impressions in the minds of your listeners or readers.

But now comes a new book which revolutionizes word helps—a book which finds the words for you, and at the same time defines them. Now you can have at your very fingertips the definite, living words that fit your thoughts and leave no doubt as to your meaning.

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In addition it contains hundreds of usually hard-to-find facts which you need daily; chapters which are complete, concise textbooks on English, composition, word building, Biblical references, geographic and historic facts, lists of the famous characters of literature, American Sobriquet, etc., which increase its value to you beyond computation.

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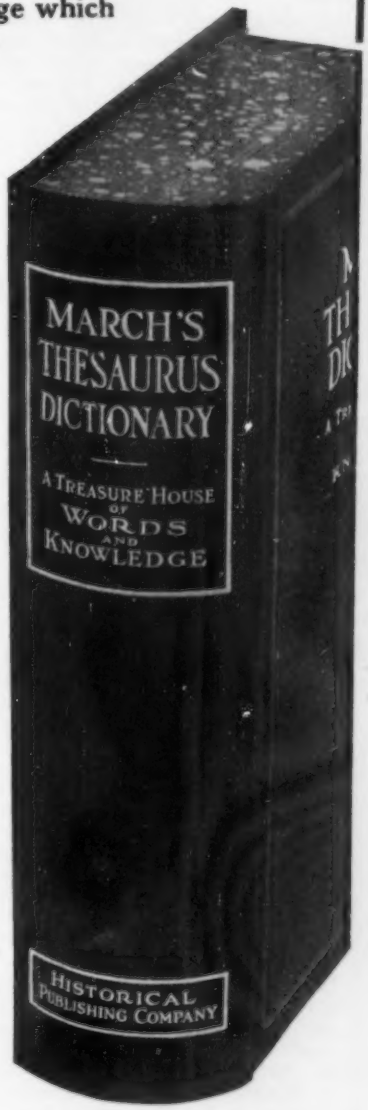

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Alaska's Fossil Mines—*Continued*

doubtedly evolved in Africa and Asia, and mammoth and mastodon came to America as immigrants. But the horse is, with equal certainty, an American product that crossed over into Asia, whence it spread during the Stone Age into Europe and Africa. Then it died out on this continent, probably before the coming of man, and was re-introduced by the Spaniards.

The most American of all modern animals, the bison, whose image shares with the Indian head the honors of our five-cent piece, has left here the record of his exodus from Asia, to prepare the way for the copper-colored tribes who followed him and who depended upon him for food, clothing and shelter throughout the whole vast interior plains and prairie country.

It is curious, and may be scientifically significant, to find the bones of the musk-ox at Elephant Point. This strange animal is not an ox, in spite of its name. It could be called the missing link between cattle and sheep but for the obvious fact that it is not missing. So far as known, it is entirely American, though it has some possible cousins in the high mountains of Asia. It seems to be of comparatively recent evolution, for no fossils of it have been found of older than Ice Age date. Will it perhaps some day be possible to trace the trek of the musk-ox across the plains and mountains of Asia to those remote peaks where lives its putative cousin, the takin, or did some relative or ancestor cross over in the opposite direction? The skulls of Elephant Point stare solemnly out of empty eye-sockets, and will not answer yet.

Another possible line of inquiry opens up in the discovery that the Arctic slope of Alaska was free from ice during the days when all of eastern America as far south as the Ohio river groaned under mile-thick glacial sheets. The parts of Alaska fronting on the Pacific were glaciated, but no signs of ice action can be found in the whole vast northern stretches, from the shores of the Arctic sea to the foot of Brooks Range, along whose crest the continental divide runs.

This does not mean that it was not cold in northern Alaska. It may have been intensely cold there in the winter, as it is now in central Siberia, but the snowfall was so scanty that it melted off every summer and did not accumulate from year to year. Glaciers will not form unless there is residual snow, solidified by partial melting and refreezing, lasting through the summer and adding new snow to its bulk during the winter.

During the Ice Age, then, the Arctic slope of Alaska was probably as open land as it is now. Yet great animals roamed there, as witness the bones of the mammoths. They were probably in this region during all or most of the glacial epoch.

Were they indifferent to the cold? Did their half-yard hair, deep wool, and thick layers of fat under the skin make them as freeze-proof as the modern musk-ox? Could they fatten up sufficiently during the short summers, and pick up enough fare during the hard, dark winters, to keep in good condition? Or did the privations tell on them at last, and cause dwindling and degeneration to set in?

Whoever first collects some hundreds of mammoth skulls from beneath the frozen soil that underlies the tundras will be able to answer some of these questions. The skulls are there, as surface finds indicate. Beneath the surface there are undoubtedly whole skeletons, and possibly complete frozen elephants, such as have been found in Siberia.

One of those cold-storage mammoths is now the pride of the Leningrad Museum. Who will bring its Alaskan brother to an American city?

Science News-Letter, March 29, 1930

Fencing

Fencing has ceased to be merely sport at the University of Pennsylvania, and is being used as a psychological device to bring about a fine adjustment between mind and body.

Exercises developed by Leonardo Terrone, fencing instructor at the university, and Dr. R. T. MacKenzie, of the department of physical education, are so planned as to draw on the student's reserves of mental alertness and at the same time to bring the body closely under control of the mind. One of the innovations introduced by Mr. Terrone is the introduction of both right and left handed fencing. Championships are now held in left handed fencing, and popularity of this branch of the art has spread as far as Brazil. Fourteen colleges now participate in the inter-collegiate league.

Psychology
Science News-Letter, March 29, 1930

When Caesar invaded Britain, he found the Britons using horse-drawn chariots to carry fighters quickly to strategic posts.

High-School Science and Physics Teachers

The Ideal Way to Interest Your Students in Radio!

WITHIN the last year there has been evinced an increasing demand for a short, simple and cheap booklet which can be utilized to interest high-school classes in the principles of radio communication (not the listening to broadcast programs) and which will enable them to build a complete short-wave transmitter and receiver.

Largely in response to this demand the American Radio Relay League, the national non-commercial association of radio amateurs, has prepared a 32-page illustrated booklet, attractively gotten up, which completely covers the construction, installation and operation of a single simple receiver and transmitter. It has been designed particularly for students between the ages of 14 and 21 and is suitable for anyone of high-school age. It enables its readers to qualify as radio amateurs and engage in two-way radio communication with other amateurs over hundreds of miles.

The booklet has been made to sell at the low price of ten cents but is available in quantity at the price of $1 per dozen copies, postpaid. We believe it affords an ideal way of starting boys in the more serious side of radio and yet at lower expenditure than the usual high-priced handbooks and manuals. The booklet is complete and thoroughly covers all details of putting a complete "station" in operation, from suggestions for learning the code to instructions for procuring licenses and operating properly, particularly in explaining the construction of fine but simple apparatus from inexpensive parts. It has been carefully prepared to answer every question and is clearly illustrated to show every detail of construction.

The pursuit of amateur radio, through individual or school stations, is the ideal method of learning radio communication, a field of unbounded possibilities. Amateur radio, in the building and operation of such a station as described in this booklet, fully embodies the principles of learning by application. Students find it an absorbing study, a fascinating hobby—and so do their instructors.

Single copies, 10c **Postpaid** **Per dozen, $1.00**

AMERICAN RADIO RELAY LEAGUE

1712 Park Street **Hartford, Connecticut**

Taylor System—*Continued*

man should be called upon to turn out the maximum work which a first-class man of his class can do and thrive under.

3. Each workman, when he works at the best pace of a first-class man, should be paid from 30 per cent. to 100 per cent. according to the nature of the work which he does, beyond the average of his class.

And this means *high wages* and *low labor cost*. These conditions not only serve the best interests of the employer, but they tend to raise each workman to the highest level which he is fitted to attain by making him use his best faculties, forcing him to become and remain ambitious and energetic, and giving him sufficient pay to live better than in the past.

Under them the writer has seen many first-class men developed who otherwise would have remained second or third class all of their lives.

Is not the presence or absence of these conditions the best indication that any system of management is either well or badly applied? And in considering the relative merits of different types of management, is not that system the best which will establish these conditions with the greatest certainty, precision and speed?

In comparing the management of manufacturing and engineering companies by this standard, it is surprising to see how far they fall short. Few of those which are best organized have attained even approximately the maximum output of first-class men.

Science News-Letter, March 29, 1930

NATURE RAMBLINGS

By Frank Thone

Piscine Hitch-Hiker

We commonly think of parasites as animals or plants that get their food by theft from some other individual who acts as an unwilling, or sometimes an unwitting host. But this is not the only kind of parasitism. We have on our own highways numberless human parasites who sponge upon motorists for free transportation. "Hitch-hikers," they term themselves, though most of them do more "hitching" than "hiking."

This system of getting along in the world by letting some other fellow take you along was invented long ago, probably long before man appeared on the earth at all, by a fish. Called *Remora* by the learned, and "pilot-fish" by simpler seafaring men, this strange creature of tropic waters "catches rides" on sharks and other large fish, sometimes even on boats, by attaching itself to them with a powerful sucking-disk apparatus which covers the whole top of its head.

The shark often takes its volunteer passenger with a very bad grace but once the pilot-fish has attached itself to his belly there is nothing for his sharkship to do but grin and bear it; for the pilot-fish cannot be dislodged by any means at the shark's command. The remora, however, limits its parasitism to this ride-stealing. It does not depend on its host for food, except possibly to snatch morsels dropped during a meal.

W. P. Pycraft, a well-known British naturalist, states that in some tropical countries the pilot-fish is used as a sort of self-directing fish-hook to catch big sea-turtles. When they find a turtle floating asleep on the surface, they release a pilot-fish with a cord tied around its tail. The fish follows its instinct, attaches itself to the breastplate of the turtle with an unbreakable suction-grip, and the fishermen haul in their catch

Science News-Letter, March 29, 1930

FIRST GLANCES AT NEW BOOKS

FLOWERS AND FLOWERING PLANTS —Raymond J. Pool — *McGraw-Hill* ($3.50). This is a book for which the teaching botanist has been waiting for a long time. It puts into complete and ordered form all the wealth of the Besseyan doctrine in flower organography and phylogeny. The Besseyan method of exposition by means of diagrammatic formulae is used to good advantage; one chart will give botanists something to chew upon for a good many hours. There are hundreds of beautifully clear line drawings that help to make the book attractive and give point and vividness to the text.

Botany

Science News-Letter, March 29, 1930

MOTION PICTURES AND ILLUSTRATED LECTURES—*General Electric Co.* (Gratis). A 27-page list of interesting reels of motion pictures and sets of lantern slides that portray the widespread activities of the General Electric Co. The ultra-modern school that is equipped with talking movie equipment can hear and see such prominent scientists as Dr. Irving Langmuir and Dr. C. W. Hewlett lecturing on oil films on water, atomic hydrogen welding, and the rays of radium; for 10 of the films have synchronized sound with the photophone system. The other reels are available both in 35 and 16 mm. film; while many of the lectures, which have the printed text with them, are on either glass or film slides. All material is supplied free for educational purposes. Copies of the booklet may be obtained from the Visual Instruction Section of the General Electric Co. at Schenectady, N. Y.

Motion Pictures—Education

Science News-Letter, March 29, 1930

THE SEA—H. A. Marmer—*Appleton* ($3). The assistant chief of the division of tides and currents of the U. S. Coast and Geodetic Survey has here produced the only modern popular book on oceanography in English. Whether one's contact with the sea comes from crossing it, from spending summer vacations on its edges, or even from reading about it, he will be interested in this book, which covers such attractive topics as "The Sea of Ancient Times," "Legendary Isles," "The Sargasso Sea," "The Gulf Stream," "The Depths of the Sea" and "Ice in the Sea."

Oceanography

Science News-Letter, March 29, 1930

ANTARCTIC ADVENTURE AND RESEARCH — Griffith Taylor — *Appleton* ($2). As Prof. Taylor, of the University of Chicago, who was with Scott on his last expedition, says in his preface: "Never has so much interest been taken in Antarctic exploration as at present." This book has been written for those whose interest in the Antarctic has been whetted by the reports of the Byrd, Wilkins and other recent Antarctic expeditions. It is a comprehensive yet concise and readable story of what man knows about the great South Polar regions. Prof. Taylor's book is one of the first two books of the Appleton New World of Science Series, edited under the auspices of Science Service, and it is the March selection of the Scientific Book Club.

Exploration

Science News-Letter, March 29, 1930

QUANTUM MECHANICS — Edward U. Condon and Philip M. Morse—*McGraw-Hill* ($3). This might well be the book that an English astronomer referred to when he said: "How I want a drink, alcoholic of course, after the heavy chapters involving quantum mechanics." (SCIENCE NEWS-LETTER: Dec. 14, 1929; p. 369). The chapters are heavy enough but to anyone who gives them the study they require, the reward will be a better understanding of one of the most important phases of modern physics.

Physics

Science News-Letter, March 29, 1930

THE THEORY OF INTEREST—Irving Fisher — *Macmillan* ($6). In 1907, Prof. Irving Fisher wrote "The Rate of Interest." This new volume, which is the result of many years' labor in rewriting his previous book, expounds Prof. Fisher's economic ideas. Various sections of the book are cleverly aimed at different types of persons. For instance "readers with a distaste for mathematics" can read the essential theory stated in words. Prof Fisher sees the theory of interest as determined by impatience to spend income and opportunity to invest it.

Economics

Science News-Letter, March 29, 1930

ROMANCE OF THE MACHINE—Michael Pupin—*Scribner's* ($1). Three essays in praise of the machine comprise this book by a great engineer and inventor.

Essays

Science News-Letter, March 29, 1930

AN INTRODUCTION TO SOCIAL ANTHROPOLOGY — Clark Wissler — *Holt* ($3.50). Fundamentals of the science of studying primitive peoples, explained in careful detail by one of the best known American specialists in this field. Dr. Wissler has not been particularly concerned with cramming his book full of facts about the customs of the world's "types." That information may be obtained in many places. A good deal of it slips naturally and incidentally into the various chapters. But Dr. Wissler's approach to the subject is rather to show what anthropology is about, what the men and women who pursue this line of knowledge are trying to do, precisely how they go about it, what they have so far accomplished and what goals lie ahead. His text thus becomes a handbook of the most usable sort.

Anthropology

Science News-Letter, March 29, 1930

THE PICTURE MAP OF FRANCE—Harold Haven Brown—*R. R. Bowker Co.* ($2.50). Those whose taste runs to maps as wall decorations will like this. Famous buildings of France border the sides of the sheet and there is a scattering of pictures over the face of the map itself. The geographic features of the country have not been skimped by this ornamentation; on the contrary, rivers and mountains, provinces and towns are clearly located, and in addition special attention is given to marking the "places famous in history, legend, literature, and art." A map of Paris is an inset in one corner.

Geography

Science News-Letter, March 29, 1930

FIRST COURSE IN ALGEBRA—Fred Engelhardt and Leonard D. Haertter —*Winston* ($1.36). A new textbook for the use of students in the first year of high school in which the work is organized about the problems to be solved, while use is stressed throughout.

Mathematics

Science News-Letter, March 29, 1930

THE DIAGNOSIS OF HEALTH—William R. P. Emerson—*Appleton* ($3). Methods of health education used at Dartmouth College and elsewhere are given in this book which will be useful to health teachers, parents and older students.

Health Education

Science News-Letter, March 29, 1930

First Glances at New Books—*Continued*

THE EARTH FOR SAM—W. Maxwell Reed—*Harcourt, Brace* ($3.50). We have to thank a small boy, the nephew of the author, for this volume, at once delightful and illuminating. The boy in question, an inquisitive nephew, fired innumerable questions, and the corpus of information needed for satisfactory answers, worked into smooth-running exposition, forms the text. The "serious" illustrations are drawn from the most approved adult geological works and museums, and as for the joyously frivolous line drawings by Karl Moseley—well, it is safe to prophesy that if you buy this book for your own nephew or son, he won't get a chance at the book until you have looked at all of them.

Geology
Science News-Letter, March 29, 1930

RURAL SOCIAL SCIENCE—Gustav A. Lundquist & Clyde B. Moore—*Ginn* ($1.72). Designed to give students in rural secondary schools an idea of the significance of the life going on around them and to suggest to them ways of bettering rural living conditions.

Sociology
Science News-Letter, March 29, 1930

CRIME IN INK—Claire Carvalho and Boyden Sparkes—*Scribner* ($2.50). Real detective stories, as engrossing as any dressed in the guise of fiction, and all hinging on the identification of handwriting. The handwriting expert of the book is David N. Carvalho, whose skill at detecting forgeries and other deceptions in writing played a dramatic part in the Dreyfus case and many other mysterious happenings.

Criminology
Science News-Letter, March 29, 1930

GEOGRAPHY SOUTHERN LANDS—Harlan H. Barrows, Edith Putnam Parker, Margaret Terrell Parker—*Silver, Burdett* ($1.25). The way of telling as well as what is to be told is important. This fourth of a series of geographies for elementary grades, completes the journey around the world.

Geography
Science News-Letter, March 29, 1930

HEALTH AND MEDICAL SERVICE IN AMERICAN PRISONS AND REFORMATORIES—Frank L. Rector—*National Society of Penal Information* ($2.50). This survey of conditions during 1929 will be of especial interest to penologists and sociologists.

Penal Hygiene
Science News-Letter, March 29, 1930

QUALITATIVE ANALYSIS—C. J. Brockman—*Ginn* ($2). Chemists brought up in the old school will not recognize a laboratory in which qualitative analysis is being taught by Dr. Brockman's method, for the familiar odor of H_2S will be lacking. By eliminating all gaseous precipitations, this method saves valuable time for the student and teacher. It uses high concentrations of the various reagents, which is also an advantage, according to the author.

Chemistry
Science News-Letter, March 29, 1930

WEATHER AND WHY—Ienar E. Elm—*McKay* ($2.50). A new book on meteorology written by an aviator for the use of aviators, both as a textbook for ground school work and for home study. Elements of particular interest to pilots are emphasized, but the book will be of interest to anyone who wants a modern and popular book on the subject.

Meteorology
Science News-Letter, March 29, 1930

MODERN COSMOLOGIES — Hector Macpherson—*Oxford* ($2.75). A historical sketch of the theories and researches on the structure of the universe from the time of Herschel down to Hubble and the final proof of the island universe theory. The author brings forth evidence to show that Herschel did not, as Proctor believed, recede from his ideas of the universe as a flat disc.

Astronomy
Science News-Letter, March 29, 1930

STUDIES IN MODERN LANGUAGE TEACHING—American and Canadian Committee on Modern Language—*Macmillan* ($1.75). Modern language teaching is one of the many problems of present day education. In twelve articles, this volume prepared under the auspices of the Modern Foreign Language Study and the Canadian Committee on Modern Languages considers various phases from the history of language teaching to the prevalence and utility of modern foreign language requirements for degrees.

Language
Science News-Letter, March 29, 1930

DEPOSITION OF THE SEDIMENTARY ROCKS—J. E. Marr—*Macmillan* ($2.40). A book on a special aspect of dynamic and structural geology which will be of exceedingly great service in both teaching and field work.

Geology
Science News-Letter, March 29, 1930

PLANT COMPETITION—F. E. Clements, John E. Weaver and H. C. Hanson—*Carnegie Institution* (pa., $3.25; cl., $4.25). Each of the three authors brings to the common task a special aptitude and training, and the result in this book is a most critical and searching examination of the factors of competition among plants, which will be of exceedingly great value in the development of ecological science in this country during the coming decade. It is well recognized among plant ecologists that the pioneer phase of purely descriptive studies has had its day, and that quantitative methods must be developed. The senior author of the present work was one of the first workers in this field, and the newer developments of his and his associates' methods, as well as those of European ecologists, particularly the Swiss, are becoming standard procedure.

Plant Ecology
Science News-Letter, March 29, 1930

THE PROBLEM OF WEAK RAILROADS—James M. Herring—*University of Pennsylvania Press* ($3). An academic study of railroads in the United States from their wartime operation by the government to the present. Those actively concerned with the future of transportation will be most interested. Dr. Herring calls the preservation of the most needed of some 600 small, weak rail carriers, which are not paying, "a fundamental part of the problem of providing adequate transportation."

Transportation
Science News-Letter, March 29, 1930

ARCHITECTURAL ACOUSTICS—*U. S. Government Printing Office* (5c). What is the matter with sound movies at your favorite theater or why is the preacher so hard to understand? If poor acoustics is the reason, this circular No. 380 of the U. S. Bureau of Standards will point out the specific cause and the remedy. Only eight pages.

Physics—Architecture
Science News-Letter, March 29, 1930

LILAC CULTURE—J. C. Wister—*Orange Judd* ($1.25). A compact, pocket-size book that will be of use to the home-owner, the practical gardener and the teacher of classes in the elements of horticulture.

Horticulture
Science News-Letter, March 29, 1930